PART 5

FLIGHT PLANNING DATA

LIST OF CHAPTERS

PART 5

Chapter 1 — LOADING AND C.G. DATA

Contents

1 CG limitations

(*a*) The CG limits, landing gear down, are as follows:

Forward limit ... 1·0 ins. forward of datum
Aft limit ... ... 14·5 ins. aft of datum

(*b*) Ballast must be carried if radar ranging is not carried.

2 Effects of consumption of expendable stores

(*a*) *Ammunition*

Firing the gun causes the CG to move aft.

(*b*) *Fuel*

Consumption from	*CG Movement*
Outboard drop tanks	Forward
Inboard drop tanks	Negligible
Wing tanks	Slight aft
Centre tanks	Slight forward
Front tanks	Aft

(*c*) Inboard drop tank jettison has a negligible effect on CG.

(*d*) RP firing or outboard drop tank jettison causes a forward CG movement.

3 Loading data

The figures given below are approximate and are intended only as a guide. Reference should always be made to AP.101B-1302-1.

(*a*) Weights fully loaded with fuel (at 7·7 lb./gall.) and ammunition.

	Clean	2 × 100 *gall. drop tanks*	4 × 100 *gall. drop tanks*
Basic	13,500	13,500	13,500
Crew (2)	360	360	360
Fuel	3,188	4,728	6,268
Gun ammo.	162	162	162
Pylons	—	115	187
Drop tanks	—	300	600
Total	17,210	19,165	21,077

(*b*) Approx. max. fuel load (lb.) for landing at 17,000 lb:

Gun ammo.	*Clean*	2 × 100 *gall.*	4 × 100 *gall.*
Full	3,000	2550	2200
None	3,150	2700	2350

PART 5

Chapter 2 — OPERATING DATA

Contents

1 Pressure error corrections

(*a*) The ASI sea level pressure error corrections are as follows:

I.A.S. — Knots	200	300	400	500	600
Clean or without a port outboard drop tank	+1	+3	+4	+3	0
With a port outboard drop tank	0	+4	+6	+9	+12

(*b*) The machmeter pressure error corrections are as follows:

Configuration	Height	Level Flight—I.M.N.				Diving—I.M.N.				
		0.7	0.8	0.85	0.9	0.93	0.94	0.985	1.0	1.1
Clean, or without a port outboard drop tank	All	Negligible						+0.015	+0.03	+0.13
With a port outboard drop tank	SL.	+0.02	+0.03	+0.03	+0.05					
	40,000	Negligible		+0.02	+0.04	+0.07	+0.09	—	—	—
	—	—	—	—	—					

(c) *Altimeter pressure error corrections*

(i) The altimeter pressure error corrections at approach speeds, clean or with drop tanks, are negligible.

(ii) The following are the PEC's in feet, at the higher speeds:

Mach No.	Sea Level	5000 ft.	10000 ft.	15000 ft.	20000 ft.	25000 ft.	30000 ft.	35000 ft.	40000 ft.
With a Port Outboard Drop Tank									
0·7	+400	+370	+320	+260	+200	+120	+40	−80	−200
0·8	+670	+670	+540	+460	+390	+300	+200	+80	−40
0·85	+1000	+920	+820	+720	+620	+520	+400	+270	+140
0·87	+1200	+1120	+1020	+920	+800	+690	+560	+430	+300
0·88	+1320	+1240	+1160	+1060	+950	+860	+760	+640	+520
Without a Port Outboard Drop Tank									
0·7	+190	+170	+150	+120	+90	+60	+20	−20	−60
0·8	+200	+170	+130	+90	+60	+10	−20	−50	−90
0·85	+180	+140	+100	+50	0	−30	−60	−100	−140
0·9	+40	+50	+50	−40	−50	−80	−110	−160	−200

2 Fuel consumption

The approximate fuel consumption in lb/min. for various RPM and altitudes at ISA conditions are given below. They apply specifically to the 4 × 100 gall. configuration:

Height	7,100 RPM	7,300 RPM	7,500 RPM	7,700 RPM	7,900 RPM	8,100 RPM
Sea level	65	85	100	125	145	165
10,000 ft.	50	65	85	100	120	125
20,000 ft.	40	55	65	75	90	95
30,000 ft.	—	40	50	55	65	70
35,000 ft.	—	—	40	45	55	55

3 Take-off distances

The following are the approximate sea level take-off distances, in yards, for various configurations, wind and temperature conditions.

(a) *Clean aircraft (AUW 17,250 lb.)*

Temperature (°C)		−15	0	15	30	45
Zero wind	Ground Run	590	680	780	910	1,060
	Distance to 50 ft	970	1,080	1,210	1,390	1,560
30K. wind	Ground Run	350	400	470	550	640
	Distance to 50 ft.	660	730	820	930	1,040

(*b*) *With* 2 × 100 *gallon drop tanks* (*AUW* 19,250 *lb.*)

Temperature (°*C*)		−15	0	15	30	45
Zero wind	Ground Run	720	830	950	1,120	1,290
	Distance to 50 ft.	1,160	1,300	1,450	1,660	1,870
30K. wind	Ground Run	440	510	590	690	800
	Distance to 50 ft.	800	900	990	1,140	1,260

(*c*) *With* 4 × 100 *gallon drop tanks* (*AUW* 21,150 *lb.*)

Temperature (°*C*)		−15	0	15	30	45
Zero wind	Ground Run	900	1,040	1,200	1,410	1,630
	Distance to 50 ft.	1,400	1,570	1,750	2,000	2,250
30K. wind	Ground Run	580	660	770	900	1,050
	Distance to 50 ft.	990	1,090	1,220	1,380	1,550

4 Landing distances

(*a*) The figures quoted are average landing distances (in yards) and are based on a touch-down speed of 5-10 knots less than the recommended threshold speeds.

(*b*) *Dry runway*

AUW	W/V	−15°C		0°C		+15°C		+30°C		+45°C	
		No para.	With para.	No para.	With para.	No para.	With para.	No para.	With para.	No para.	With para.
18,500 lb.	Zero wind	—	895	—	965	—	1030	—	1100	—	1165
	30K headwind	—	480	—	515	—	545	—	580	—	610
17,000 lb.	Zero wind	1060	815	1130	870	1195	920	1265	975	1330	1020
	30K headwind	565	440	605	475	645	505	685	540	720	565
16,000 lb.	Zero wind	995	770	1060	820	1125	870	1190	920	1250	970
	30K headwind	555	400	590	430	625	455	660	485	690	510

(c) *Wet runway*

AUW	W/V	0°C		+15°C		+30°C		+45°C	
		No para.	With para.	No para.	With para.	No para.	With para.	No para.	With para.
18,500 lb.	Zero wind	—	1380	—	1470	—	1560	—	1640
	30K headwind	—	750	—	800	—	850	—	895
17,000 lb.	Zero wind	1810	1265	1925	1345	2035	1425	2145	1503
	30K headwind	980	680	1045	730	1105	780	1165	825
16,000 lb.	Zero wind	1725	1195	1830	1270	1935	1350	2040	1425
	30K headwind	945	645	1000	690	1060	735	1115	780

5 Flight planning tables

(a) The tables on the following pages show the flight planning data for:

(i) *Climbing*

The climb table gives the data for climbs using the speeds recommended in Part 3, Chap. 2, para. 1.

(ii) *Cruising*

Each separate altitude block in the cruise table shows:

1. The speed for maximum range, the appropriate ANM/100 lb. and the appropriate fuel consumption for the particular height. In addition a speed band is given, use of any speed within which should not cause more than 5% reduction in range.

2. The range obtainable for various amounts of available fuel when flying at the best range speed for the height. The range given is to the point of let-down, allowance being made for the descent fuel required.

3. The range obtainable for various amounts of available fuel including the distance covered on the climb,

if a climb is made to another altitude. In this case the climb must be made at the speed given in Part 3, Chap. 2, para. 1, and the flight continued at the new altitude at the best range speed for that height.

NOTE: The range at any altitude is independent of temperature, but dependent on the weight of fuel carried.

(iii) *Descent*

The descent table gives the data for descending from one height to another.

(*b*) *Use of the tables*

NOTE: The ANM/100 lb. values in the table are achieved figures, arbitrarily reduced by 5% to allow for variation between individual aircraft.

(i) *Pre-flight planning*

Enter the cruise data table in the sea level block at the fuel state applying immediately after take-off. Select the height at which maximum range is available at that fuel state. The distance available includes distance covered on the climb, but not on the descent. (Absolute maximum range is obtained by adding on the descent distance provided that the let-down is commenced at that distance from the destination). For short range flights inspect the sea level block and select the height at which the distance to be covered requires the least amount of fuel. This is the best altitude for flight.

(ii) *In flight planning*

At any stage of a flight the available range may be ascertained by applying the fuel state to the level flight range in the particular altitude block. If increase in range is required, or if a climb has to be made, the new available range may be obtained by entering the existing altitude block at the particular fuel state and moving vertically downwards within the block until the new altitude is reached. Figures in heavy type indicate the best altitude for the maximum increase in range. Above these heights no further range increase is possible. If a descent is necessitated the new range is shown by moving direct from the existing altitude level flight range for the particular fuel state to the new altitude level flight range.

CLEAN AIRCRAFT

FUEL CONTENTS: 3,188 lb. AVTAG (7·7 lb/gall.)

ALLOWANCES:

START-UP AND TAXY	100 lb.
TAKE-OFF TO CLIMB SPEED ...	180 lb.
LANDING (excluding descent fuel) ...	620 lb.

Climb data

From	*To*	*Fuel (lb.)*	*Dist. (N.M.)*	*Time (Mins.)*
Sea level	10,000 ft.	350	11	3
	20,000 ft.	520	29	4½
	30,000 ft.	700	46	6¾
	40,000 ft.	900	72	10
	45,000 ft.	1,050	99	14
10,000 ft.	20,000 ft.	170	18	1½
	30,000 ft.	350	35	3¾
	40,000 ft.	550	61	7
	45,000 ft.	700	88	11
20,000 ft.	30,000 ft.	180	17	2¼
	40,000 ft.	380	43	5½
	45,000 ft.	530	70	9½
30,000 ft.	40,000 ft.	200	26	3¼
	45,000 ft.	350	53	7¼
40,000 ft.	45,000 ft.	150	27	4

Fuel and time are given from wheels rolling; allowance for take-off and acceleration to climb speed, 1½ mins. Climb at 430 kts./0·85M.

Cruise data — clean aircraft

Fuel Available — Pounds		GAUGED FUEL (Actual fuel state)				
		2,908*	2,500	2,000	1,500	1,000
Sea Level	Range	220	180	135	85	35
ANM/100 lb - 9·6	10,000ft	290	235	170	100	**35**
Lb/min - 57	20,000ft	345	275	190	**110**	—
Best Range Speed - 330 K.	30,000ft	385	305	200	100	—
95% Range Speed 430 K.	40,000ft	430	**330**	**205**	80	—
	45,000ft	**430**	325	195	—	—
10,000 ft.	Range	—	245	180	115	**45**
ANM/100 lb - 13·4	20,000ft	—	295	210	**125**	40
Lb/min — 47·8	30,000ft	—	330	225	120	—
Best Range Speed - 310K.	40,000ft	—	360	**235**	110	—
95% Range Speed 370 K.	45,000ft	—	**365**	230	95	—
20,000 ft.	Range	—	305	220	135	**50**
ANM/100 lb - 16·8	30,000ft	—	345	245	**140**	35
Lb/min - 37·8	40,000ft	—	385	260	135	—
Best Range Speed - 290 K.	45,000ft	—	**390**	**260**	125	—
95% Range Speed 0·75 M.						
30,000 ft.	Range	—	370	265	160	**60**
ANM/100 lb - 20·7	40,000ft	—	415	**290**	**165**	40
Lb/min - 34·5	45,000ft	—	**420**	285	155	—
Best Range Speed - 0·7 M.						
95% Range Speed 0·82 M.						
40,000ft.	Range	—	440	**315**	**190**	**65**
ANM/100 lb - 25·1	45,000ft	—	**445**	310	180	50
Lb/min - 30·8						
Best Range Speed - 0·81 M.						
95% Range Speed 0·87 M.						
45,000 ft.	Range	—	**455**	**325**	**195**	**60**
ANM/100 lb - 26·4						
Lb/min - 29·6						
Best Range Speed - 0·82 M.						
95% Range Speed 0·87 M.						
Fuel Available — Pounds		2,908*	2,500	2,000	1,500	1,000

*Excludes start-up, taxy and take-off allowances

WITH 2 × 100 GALLON DROP TANKS

FUEL CONTENTS: 4,728 lb. AVTAG (7·7 lb/gall.)

ALLOWANCES:

START-UP AND TAXY ... ... 100 lb.

TAKE-OFF TO CLIMB SPEED ... 200 lb.

LANDING (excluding descent fuel) ... 620 lb.

Climb data

From	*To*	*Fuel (lb.)*	*Dist. (N.M.)*	*Time (Mins.)*
Sea level	10,000 ft.	400	14	3¼
	20,000 ft.	600	32	5½
	30,000 ft.	800	51	8
	40,000 ft.	1,000	80	12½
10,000 ft.	20,000 ft.	200	18	2¼
	30,000 ft.	400	37	4¾
	40,000 ft.	600	66	9¼
20,000 ft.	30,000 ft.	200	19	2½
	40,000 ft.	400	48	7
30,000 ft.	40,000 ft.	200	29	4½

Fuel and time are given from wheels rolling; allowance for take-off and acceleration to climb speed 1¾ mins.

Climb at 430 kts/0·85M.

Cruise data — 2 x 100 gallon drop tanks

Fuel Available — Pounds		Full fuel	GAUGED FUEL (Actual fuel state)				
		4,428*	3,188	2,500	2,000	1,500	1,000
Sea Level	Range	370	245	175	130	85	**35**
ANM/100 lb - 9·4	10,000ft	450	295	210	150	90	30
Lb/min - 52	20,000ft	570	370	260	180	**100**	—
Best Range Speed - 310 K	30 000ft	665	420	285	185	85	—
95% Range Speed 380 K.	40,000ft	**780**	**480**	**310**	**190**	—	—
10,000 ft.	Range	—	305	225	165	105	40
ANM/100 lb 12·2	20,000ft	—	390	280	200	**120**	**40**
Lb/min - 46·8	30,000ft	—	440	310	215	115	—
Best Range Speed - 300 K.	40,000ft	—	**515**	**350**	**225**	105	—
95% Range Speed 380 K.							
20,000 ft.	Range	—	400	290	210	130	**50**
ANM/100 lb - 16·1	30,000ft	—	465	330	230	130	35
Lb/min - 37·6	40,000ft	—	**550**	**375**	**250**	**130**	—
Best Range Speed 275 K.							
95% Range Speed 0·7 M.							
30,000 ft.	Range	—	490	355	255	160	**60**
ANM/100 lb - 19·7	40,000ft	—	**580**	**410**	**290**	**165**	45
Lb/min - 35							
Best Range Speed - 0·7 M.							
95% Range Speed 0·8 M.							
40,000 ft.	Range	—	**600**	**430**	**310**	**185**	**65**
ANM/100 lb - 24·3							
Lb/min 31							
Best Range Speed - 0·79 M.							
95% Range Speed 0.85 M.							
Fuel Available — Pounds		4,428*	3,188	2,500	2,000	1,500	1,000

*Excludes start-up, taxy and take-off allowances

WITH 4 × 100 GALLON DROP TANKS

FUEL CONTENTS: 6,268 lb. AVTAG (7·7lb./gall.)

ALLOWANCES:

START-UP AND TAXY ... ... 100 lb.

TAKE-OFF TO CLIMB SPEED ... 230 lb.

LANDING (excluding descent fuel) ... 620 lb.

Climb data

From	*To*	*Fuel (lb.)*	*Dist. (N.M.)*	*Time (Mins.)*
Sea level	10,000 ft.	470	18	4
	20,000 ft.	700	37	6½
	30,000 ft.	930	59	9¾
	35,000 ft.	1,050	74	12
10,000 ft.	20,000 ft.	230	19	2½
	30,000 ft.	460	41	5¾
	35,000 ft.	580	56	8
20,000 ft.	30,000 ft.	230	22	3¼
	35,000 ft.	350	37	5½
30,000 ft.	35,000 ft.	120	15	2¼

Fuel and time are given from wheels rolling; allowance for take-off and acceleration to climb speed 2 mins.

Climb at 370 kts/0·82M.

Cruise data — with 4 x 100 gallon drop tanks

Fuel available — Pounds		Full fuel 5938*	Out b'ds. e'pty 4728	GAUGED FUEL (Actual fuel state) 3188	2500	2000	1500	1000
Sea Level	Range	470	355	225	165	120	75	**35**
ANM/100 lb - 8·65 Lb./min - 58·4 Best Range Speed - 295 K 95% Range Speed 365 K	10,000ft	665	460	280	202	145	85	30
	20,000ft	790	545	325	225	155	**85**	—
	30,000ft	935	630	360	245	160	75	—
	35,000ft	**1010**	**680**	**385**	**255**	**160**	—	—
10,000 ft.	Range	—	470	290	215	155	100	**40**
ANM/100 lb - 11·6 Lb/min - 45 Best Range Speed - 280 K. 95% Range Speed 325 K.	20,000ft	—	555	340	240	170	**100**	30
	30,000ft	—	650	385	265	180	95	—
	35,000ft	—	**705**	**410**	**280**	**185**	90	—
20,000 ft.	Range	—	570	355	255	185	115	**45**
ANM/100 lb - 14·1 Lb/min - 40·7 Best Range Speed - 260 K. 95% Range Speed 320 K.	30,000ft	—	670	405	290	205	115	30
	35,000ft	—	**730**	**440**	**310**	**215**	**120**	—
30,000 ft.	Range	—	685	425	305	220	135	**50**
ANM/100 lb - 17·2 Lb/min - 38·7 Best Range Speed - 260 K. 95% Range Speed 0·8 M.	35,000ft	—	**745**	**455**	**325**	**230**	**135**	40
35,000 ft.	Range	—	**755**	**465**	**335**	**240**	**145**	**50**
ANM/100 lb - 18·9 Lb/min - 36·5 Best Range Speed - 0·72 M. 95% Range Speed 0·83 M.								
Fuel Available — Pounds		5938*	4728	3188	2500	2000	1500	1000

*Excludes start-up, taxy and take-off allowances

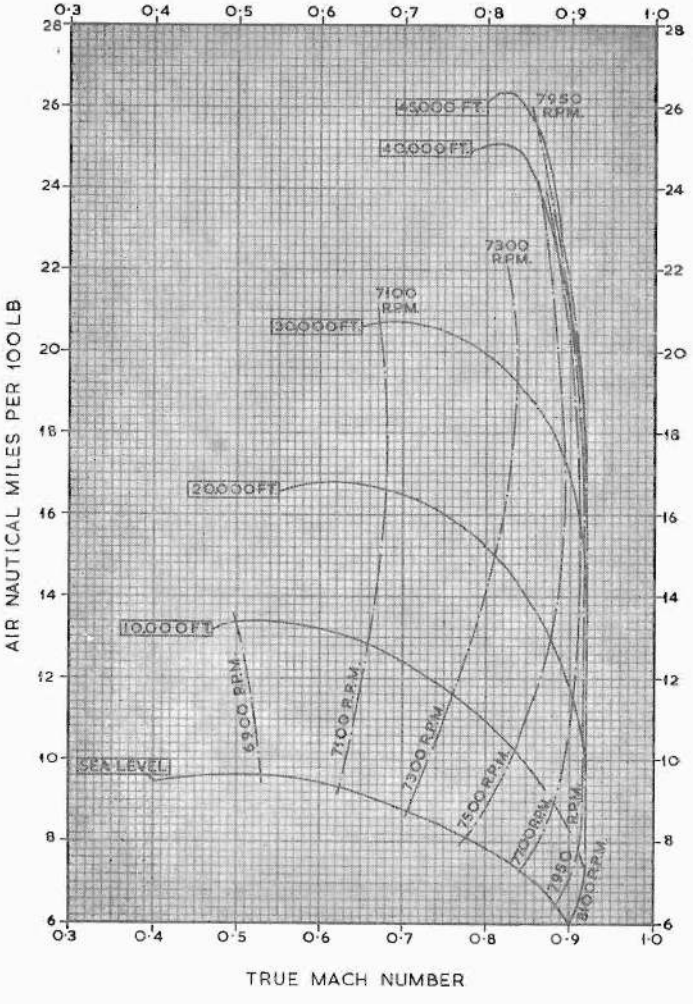
ALL CONFIGURATIONS

Descent data (QGH)

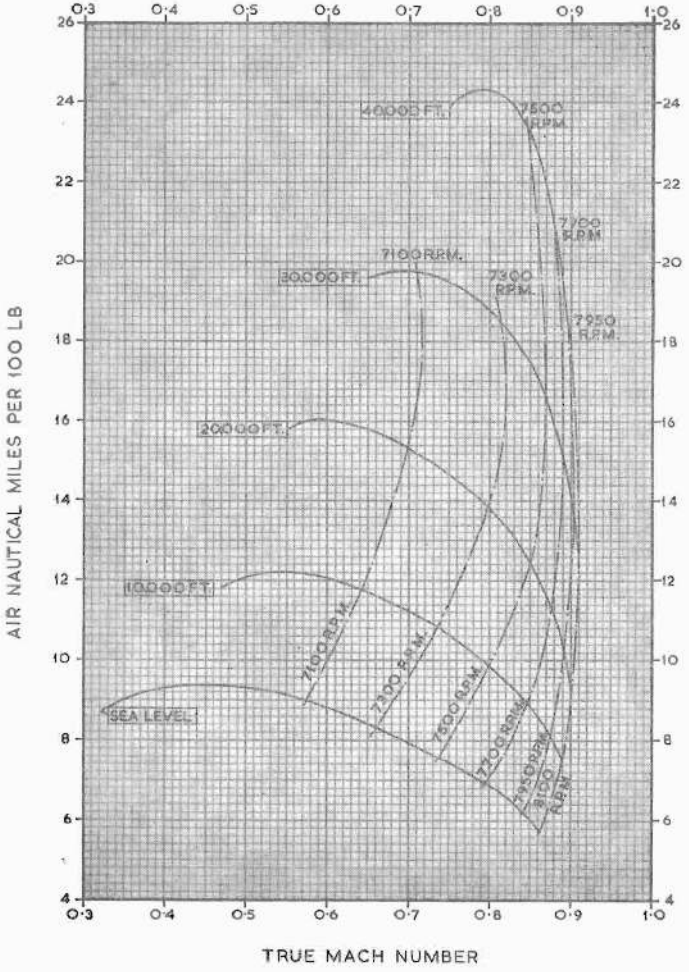
From	*To*	*Fuel (lb.)*	*Dist. (N.M.)*	*Time (Mins.)*
45,000 ft.	30,000 ft.	50	12	2
	20,000 ft.	80	19	3
	10,000 ft.	110	27	4½
	Sea Level	150	35	7¼
30,000 ft.	20,000 ft.	30	7	1
	10,000 ft.	60	15	2½
	Sea Level	100	23	5¼
20,000 ft.	10,000 ft.	30	8	1½
	Sea Level	70	16	4¼
10,000 ft.	Sea Level	40	8	2¾

AIRBRAKE	OUT, FLAPS DOWN 23°
RPM	6,500
SPEED	300K.

CLEAN AIRCRAFT



WITH 2×100 GALLON DROP TANKS



WITH 4x100 GALLON DROP TANKS